US Army Medical Research and Materiel

Technology Available for Licensing

Detoxification with Sponges or Foams Containing Plurality of Enzymes and Encapsulated Indicator

Features and advantages:

- **Extreme temperatures and/or denaturing conditions or water do not affect enzyme stability**
- **Suitable for long-term (weeks to months) detection of OPs in remote locations**
- **Kit could contain indicator and means of transmitting the results to a central location point**

This invention provides methods and compositions for neutralizing, detoxifying, or decontaminating equipment and/or personnel exposed to organophosphorus and organosulfur compounds (both referred to as OP compounds). The composition consists of a reusable polymeric sponge or foam on which one or more enzymes have been immobilized. The enzymes act to detoxify a diverse array of OP compounds, and may include acetylcholinesterase (AChE), butyrylcholinesterase (BChE), triesterase, pseudocholinesterase, choline oxidase, peroxidase, organophosphate hydrolase (OPH), paraoxonase, phosphotriesterase, or laccase. An indicator is also embedded in the sponge or foam for measuring its capacity to detoxify OP compounds. The indicator may be fluorescent, chemiluminescent or a visible chromogen, or may be an electrode.

OP compounds are used extensively in insecticides and chemical warfare nerve agents, such as sarin, soman, and tabun. The detection and detoxification of OP compounds is important for protection of human health and the environment.

The sponge-like support could be used on natural, synthetic, and biological surfaces including wounds as the immobilized enzymes will not leach into them. The foam-like support could potentially be sprayed onto a toxic spill to encapsulate, detoxify, and allow removal of the contaminants. When compared to the protection provided by the standard military decontamination M291 kit, the invention provided 4-5 times more protection to the skin of guinea pigs exposed first to soman and then to sponges containing one or more of the detoxifying enzymes and additives listed above. The sponge could prevent cross-contamination between medical personnel and contaminated subjects.

Patent Status

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